

g:5 displaced laterally, g:6 near posterior margin of cover about in line with anterior four setae (fig. 2); anal opening more elongated than genital, a preanal piece present, each cover with two simple setae; fissure *iad* transversely placed at level of anterior margin of anal opening, ad:3 lateral to fissure; ad:2 and ad:1 lateroposterior and posterior respectively.

Legs heterotridactylous, the median claw slightly heavier than laterals; femora II, III, IV with ventral keel.

Measurements: Length, 360 μ ; width, 264 μ .

Collection data: Fifteen specimens (13 males, 2 females) were taken from moss, four miles south of Waldport, Oregon, 7 February 1960, by G. Krantz and Lattin. The type, a male, will be deposited with a paratype female in the U.S. National Museum.

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FOUR NEW SPECIES OF CULEX, SUBGENUS MOCHTHOGENES FROM SOUTHEAST ASIA (DIPTERA: CULICIDAE)¹

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ABSTRACT—Four new species of *Culex* (*Mochthogenes*) from Southeast Asia are described and illustrated: **kiriensis** from Cambodia and Thailand; **otachati** from Cambodia and Thailand; **bokorensis** from Cambodia; **selai** from Cambodia and Borneo.

Bram (1967) in his revision of the genus *Culex* from Thailand, reviewed only three species in the subgenus *Mochthogenes*, namely, *malayi* (Leicester 1908), *foliatus* Brug 1932 and *hinglungensis* Chu 1957. These species have also been found in Cambodia by the senior author, the first one being common in the Mekong valley; the two others were collected many times in the forests of the mountainous area in the

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south of the country. In the same locality, the senior author also collected several males among which are the four new species described here. At about the same time some additional material of these new species was obtained in Thailand by the junior author and others have been found in collections made by D. C. and E. B. Thurman in northern Thailand and by D. H. Colless in Borneo.

The four new *Mochthogenes* described here all show the essential characters as given for the subgenus by Bram (1967:33).

***Culex (Mochthogenes) kiriensis*, n. sp.**

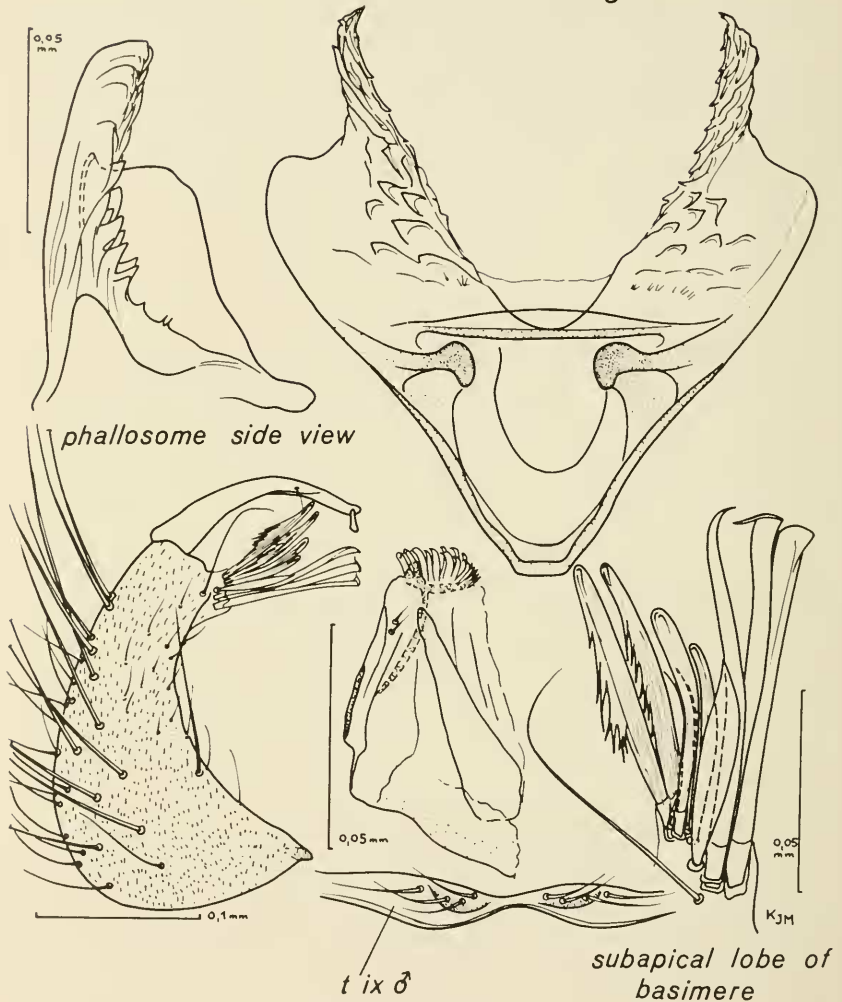
(Fig. 1)

FEMALE AND IMMATURE STAGES. Unknown.

MALE. A medium or large sized species as compared to other known members of the subgenus in the Oriental region; without distinctive ornamentation, nevertheless, it may be recognized by the entirely pale anterior surface of the hind femur, intensely plumose antenna, vertex with numerous pale narrow decumbent scales and by other details as noted below. *Head*. Vertex extensively clothed with numerous pale to yellowish white scales, a small patch of pale to grayish broad scales at sides, erect forked scales yellowish brown to light brown; palpus rather thin and slender, segmentation not clearly marked, its length about 0.2 of the length of proboscis; false joint of proboscis present at about 0.7 of its length from the base; basoventral setae hairlike and varying in length, the longest ones about 0.7 the length of the palpus. *Thorax*. Scutal integument light brown; scutellum paler; scutal scales predominantly brown except for a few pale ones at the margin of the prescutellar space; upper part of pleuron deep chestnut brown, lower part pale; propleuron with 3 strong and 6-7 weak bristles; 4-6 upper and 1 lower mesepimeral bristles present. *Wing*. Length 2.5 mm.; cell R-2 about 2 times longer than its stem; all scales narrow, very dense on veins C, Sc, R and M, rather sparse on veins Cu and A. *Legs*. Anterior surface of hind femur pale to almost white scaled; fore and mid femora almost entirely dark scaled except on ventral surfaces; all tibiae and tarsi dark. *Adbomen*. Terga and sterna brown scaled. *Terminalia* (fig. 1). Tergal lobes of segment IX poorly developed, each with 4-5 weak setae; basimere slender, tergomesal margin with 4-5 weak setae and 1 strong submarginal near base; proximal part of subapical lobe with 3 stout rodlike setae, 1 slightly hooked and 2 truncate apically and 1 shorter pointed leaf-like seta; basal seta hairlike but strong, its base near those of the proximal rods; distal part with a group of 2 fine hairlike and 4-5 blade-like setae; the latter all with blunt or round apices and 3 with fringes of fine, transparent spicules on their dorsal margins; distal half of distimere narrow with a short and slender subapical claw, ventral subapical seta present, dorsal one absent; phallosome similar in shape to *malayi* as figured by Bram (1967: 40, fig. 12B); lateral plate with a more or less pointed apex, inner tergal surface provided with 5-7 strong denticles and irregular folds of integument along inner margin towards apex; crown of paraproct with 8-10 coarse spicules laterally and tergally and a few spinelike spicules internally; 2 cercal setae present.

TYPE DATA. Holotype male (409) with slide of terminalia; type locality: Bokor Hill, *Kampot*, CAMBODIA, 25 April 1968, J. M. Klein

Fig. 1



Culex kiriensis n. sp.

(USNM); paratypes 3 males (305, 309, 408) with slides of terminalia, 1 April 1968 (USNM); 1 male (361), 19 April 1968; 1 male (360), 23 May 1968; 2 males (435, 436), 25 June 1968 (Centre ORSTOM, Bondy, France), all collected at Kirirom Hills, Kompong Speu, CAMBODIA by J. M. Klein.

DISTRIBUTION. Specimens examined: CAMBODIA, 8 males as listed in the type data. THAILAND, *Lampang*, Ngao, 5 males (M611-1, -3, -4, -12, -13) with slides of terminalia, 21 March 1953, D. C. and E. B. Thurman (USNM); *Nakhon Ratchasima*, Koa Yai National Forest, 2 males (SS30) with slides of terminalia (681204-6, 681205-1), 31 October 1967, S. Sirivanakarn (USNM).

TAXONOMIC DISCUSSION. *C. kiriensis* n. sp. is very closely related to the Malayan *hackeri* Edwards 1923, a paratype male of which was kindly made available to us by Dr. P. F. Mattingly. It is recognized as distinct from the latter primarily by a few but significant features in the lateral plate of the phallosome. In *kiriensis* n. sp. the shape of this structure is as described above and with denticles confined to the inner tergal margin, whereas in *hackeri*, the lateral plate is oval-shaped in tergal view and with denticles spreading over its whole tergal surface. The two species certainly belong together in a species group or complex in which basimeres, distimeres and setae on the subapical lobe are very similar to certain forms of *Neoculex*, particularly *hayashii* Yamada 1917 from Japan and *tenuipalpis* Barraud, 1924 from India. No significant variations were observed in the specimens collected from Thailand as compared to the type series from Cambodia.

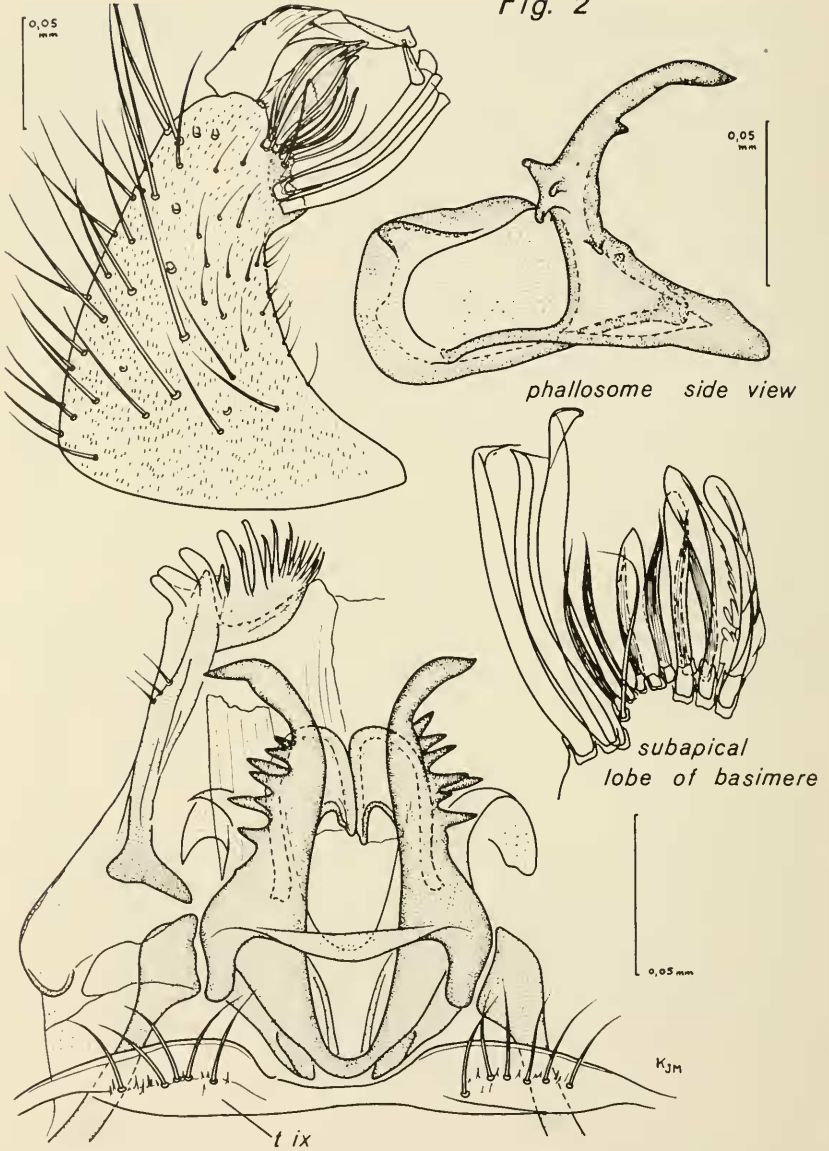
BIOLOGY. This species is usually encountered in mountain areas. The male specimens were collected along the margins of torrents and flooded ground under deep shade of tropical forest at altitudes between 300–600 meters. Nothing is known about its breeding habitat.

***Culex (Mochthogenes) otachati*, n. sp.**
(Fig. 2)

FEMALE AND IMMATURE STAGES. Unknown.

MALE. A medium sized species recognizable as distinct from others primarily by the male terminalia and as noted below. *Head.* Narrow decumbent scales on vertex brown, broad scales almost entirely grayish except for a few pale ones along the orbital line; erect forked scales brown; palpus a little less than 0.2 of the length of proboscis; false joint of proboscis present and usually flexed at the middle; basoventral setae strong, hairlike, the longest ones as long as the length of the palpus. *Thorax.* Scutal integument dark brown with sparse shiny brown scales; pleura brown, with 2–5 upper and 1 lower mesepimeral bristles present. *Wing.* Length 2.2 mm.; most veins moderately densely scaled. *Legs.* Anterior surface of fore and mid femora dark brown, hind femur dark brown but paler along ventral margin. *Abdomen.* Terga and sterna dark brown. *Terminalia* (fig. 2). Tergal lobes of segment IX very poorly developed, with 4–7 small setae; tergomesal margin of basimere with several short and weak setae, specialized submarginal setae absent; lateral sternal surface with very strong bristles; proximal part of subapical lobe with 3 subequal rods, gently curved in the middle and hooked apically; distal part with 1 basal external seta, 4–5 narrow blade-like setae and 3–4 leaflike setae of which the most distal ones with dorsal margins serrate; distimere with basal half broad and rough in outline, bearing 1–2 scalelike setae just proximad of dorsal curvature

Fig. 2



Culex otachati n. sp.

and 1 tiny seta laterally, distal half curved with truncate apex terminating in a point dorsally, subapical claw strong and rather long, dorsal and ventral subapical setae inconspicuous or absent; phallosome very distinctive, lateral plates heavily sclerotized and deeply pigmented, each with a stout, rod-shaped and pointed tergal arm provided with 6-7 heavy lateral denticles and curved outward subapically; ventral lobe of lateral plate very broad, well seen in tergal and side view; paraproct strongly sclerotized, crowned with strong spines externally and several short and fine ones internally; 3 cercal setae present.

TYPE DATA. Holotype male (327) with slide of terminalia, Kirirom Hills, O Tachat, *Kompong Speu*, CAMBODIA, 19 April 1968, J. M. Klein (USNM); paratypes 1 male (328) with slide of terminalia, same data as holotype; 2 males (429, 430) with slide of terminalia, same locality as holotype, 27 December 1968; 2 males (412, 415) with slides of terminalia, Pichnil, Stung Chral, *Kompong Speu*, 6 June 1968, all collected by J. M. Klein (USNM); 2 males (329, 332), same data as holotype; 2 males (413, 414), same locality as holotype, 23 May 1968; 1 male (432) with slide of terminalia and 3 males, same locality as holotype, 27 December 1968; 3 males (370, 371, 411), Pichnil, Stung Chral, *Kompong Speu*, 6 June 1968, all collected by J. M. Klein (Centre ORSTOM, Bondy, France).

DISTRIBUTION. Specimens examined: CAMBODIA, 17 males, as indicated in the type data. THAILAND, *Nakhon Ratchasima*, Koa Yai National Forest 1 male (SS31) with slide of terminalia (681205-2), 1 November 1967, S. Sirivanakarn (USNM).

TAXONOMIC DISCUSSION. *C. otachati* n. sp. is strikingly differentiated from other oriental *Mochthogenes* by the form of the lateral plate of the phallosome and by details in the structure of the basimere and distimere. On these characters it does not appear to be related to other species known at the present time. It is, however, quite indistinguishable from all the rest by general external features, except as indicated above.

BIOLOGY. Like *kiriensis* n. sp., this species is rather common in mountainous areas or in the hills. All specimens were collected along margin of torrents under deep shade of tropical forest. The breeding habitat is not known.

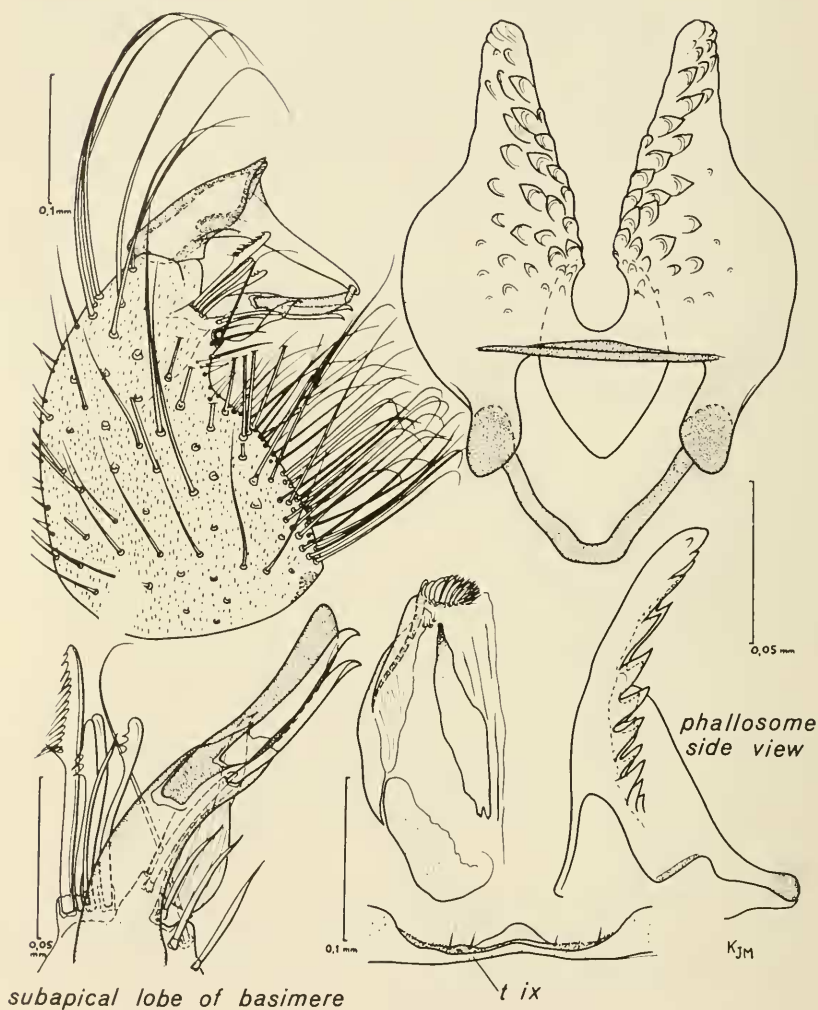
***Culex (Mochthogenes) bokorensis*, n. sp.**

(Fig. 3)

FEMALE AND IMMATURE STAGES. Unknown.

MALE. Very similar to *kiriensis* n. sp. in size and in general external characters, differing from it markedly in terminalia and as follows. *Head.* Narrow decumbent scales on vertex relatively coarser; erect forked scales brown; palpus length varying between 0.2-0.25 of the length of proboscis, segmentation clearly marked; false joint of proboscis present at a little beyond the middle; longest basoventral setae as long as palpus; antenna with flagellar hairs moderately strong, but not as

Fig. 3

*Culex bokorensis* n. sp.

dense as in *kiriensis* n. sp. *Thorax*. Scutal scales entirely dark brown; propleuron with 1 strong and 7-8 weak bristles. *Wing*. Length 2.7 mm.; scales relatively dense. *Legs*. Anterior surface of hind femur pale scaled on basal 0.7, dark brown on apical 0.3; fore and mid femora entirely dark brown. *Terminalia* (fig. 3). Lobes of tergal segment IX very poorly developed with 2-3 tiny short setae; basimere remarkably stout and basally bulbous in shape; tergomesal margin

strongly convex with numerous strong marginal setae, a group of several long and curved bristles near base and 1-2 rows of equally strong bristles towards apex; lateral sternal surface with several thick and long bristles; proximal part of subapical lobe with a prominent elongate tubercle directed mesad and bearing at its apex 2 slender subequal rods and 1 thick, dark, apically blunt rod, and at its base 1 broad distorted leaflet, 1 strong seta and 3 small weaker setae; distal part of subapical lobe with 4 stout, apically serrated blades and 1 hairlike seta; distimere with basal half thick and broadened, distally with a pronounced angle at the middle of the usual curvature, distal half straight and tapered to a slender tip, subapical claw relatively thick and short, dorsal and ventral subapical setae absent; phallosome stout and strongly sclerotized, inner margin of lateral plate provided with several heavy denticles and fewer small denticles from the broadest part to apex; crown of paraproct with several pointed spines; 2-3 cercal setae present.

TYPE DATA. Holotype male (386) with slide of terminalia, Bokor Hill, *Kampot*, CAMBODIA, 24 April 1968, J. M. Klein (USNM); paratype 1 male (250), same locality as holotype, 9 January 1968, J. M. Klein (Centre ORSTOM, Bondy, France).

DISTRIBUTION. Specimens examined: CAMBODIA, 2 males as indicated in the type data. 16 males, same locality, February 1969, J. M. Klein (Centre ORSTOM, Bondy, France).

TAXONOMIC DISCUSSION. *C. bokorensis* n. sp. is very distinctive from other oriental *Mochthogenes* in several features of terminalia. The peculiar shape of the basimere and distimere strongly indicate a close affinity with members from the Ethiopian region as recently reviewed by Brunhes et al. (1967). It is, however, clearly distinguished from the Ethiopian species by details of the subapical lobe, absence of spines or setae on distimere and in the shape and characteristic denticles of the phallosome.

BIOLOGY. *C. bokorensis* n. sp. occurs at relatively high elevation as do the other 2 species described above. Collections were made along torrents under forest at an altitude of 300-800 meters.

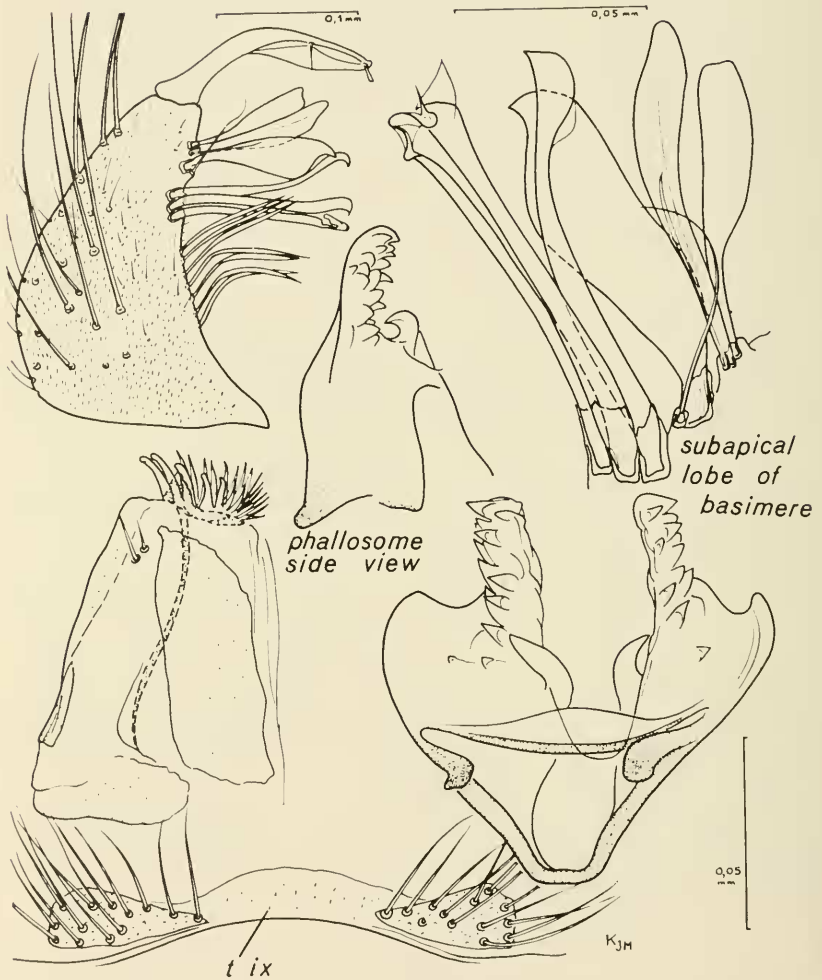
***Culex (Mochthogenes) selai*, n. sp.**

(Fig. 4)

FEMALE AND IMMATURE STAGES. Unknown.

MALE. As described for *C. kiriensis* n. sp.; differing from it as follows. *Head.* Vertex predominantly clothed with pale to grayish broad scales forming a relatively broader white patch at sides; erect scales entirely dark brown; palpus very thin and short, its length at most 0.15 of the length of proboscis; proboscis with false joint indistinctly marked at about 0.7 of its length from the base; basoventral setae few, tiny and only about 0.3 the length of the palpus. *Thorax.* Scutal integument brown with dark brown supraalar area, scales dark brown; pleuron pale to light brown. *Wing.* Length 2.2 mm.; cell R-2 about 2.5 times longer than its stem. *Legs.* Anterior surface of hind femur dark scaled but paler along ventral

Fig. 4

*Culex selai* n. sp.

margin. *Abdomen*. Entirely dark scaled. *Terminalia* (fig 4). Lobes of tergal segment IX well developed, each with about 10 fairly strong setae; tergomesal margin of basimere with a row of 7 strong, distally flattened, pointed setae and a group of short tiny setae underneath the subapical lobe; proximal part of subapical lobe clearly separated from the distal part, with 3 subequal rods, 2 with slightly

hooked apices and 1 with a twisted apex; distal part with 1 strong hairlike seta followed by 1 very broad acuminate leaflet, 1 very inconspicuous seta and 2 narrow leaflets, one round-tipped, the other angulate at tip; distimere with a slender subapical claw and a small ventral subapical seta; inner margin of phallosome provided with a large basal denticle, external margin of apical part bears many strong denticles with their apices all directed outwards; paraproct moderately sclerotized; crown relatively small with few blunt spicules and several spines.

TYPE DATA. Holotype male (212) with slide of terminalia, Kompong Sela, *Koh-Kong*, CAMBODIA, 5 November 1967, reared from larva collected from a pool under forest in foothill area, J. M. Klein (USNM); paratype 1 male (312), same data as holotype (Centre ORSTOM, Bondy, France).

DISTRIBUTION. Specimens examined: CAMBODIA, 2 males (associated larval skins lost), as indicated in the type data. 9 males (2 with slide of terminalia), same locality, May 1969, J. M. Klein (Centre ORSTOM, Bondy, France). BORNEO, North Borneo, Tawau 1 male (B60/22) with slide of terminalia and antenna, February 1960, D. H. Colless (USNM). Probably widespread in Southeast Asia.

TAXONOMIC DISCUSSION. This species is closely related to *pluvialis* Barraud 1924 from India; however, close comparison with some topotypical specimens shows it to be generally darker, with darker broad scales on vertex, it also differs in the presence of 7 stronger specialized setae on the tergomesal margin of basimere instead of 4,5 as in *pluvialis*, and in having coarser denticles on the lateral plate of the phallosome.

BIOLOGY. *C. selai* n. sp. was found at a lower elevation than the 3 species described above. The male specimens in the type series were reared from larvae collected in a pool in the foothill area at altitude of about 250 meters. No field data is available for the single male collected in Borneo.

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